

REMARKS

Claims 1-3 are all the claims pending in the application prior to this amendment. New claim 4 has been added, directed to the combination of the semiconductor chip and adhesive tape, per the Examiner's suggestion at page 2 of the Office Action. It is believed that the subject matter of claim 4 is supported by the specification, and by the express recitations of the original claims. New claim 5 is discussed below. Entry is respectfully requested.

As a preliminary matter, Applicants request that the Examiner acknowledge the claim to foreign priority as well as receipt of certified copies of the priority document from the International Bureau.

In paragraph 8 at page 4, the drawings stand objected to for the reasons indicated.

The Examiner states that it is unclear what "A" is in the drawings, apparently referring to Fig. 1B and the specification at page 3.

In response, the Examiner is requested to note and approve the specific corrections proposed to Fig. 1B, to delete reference to "A". The specification on page 3 indicates that the leadframe is designated as "1"; thus "A" is inadvertently redundant and has been deleted from page 3 as well. Also, page 3 and Fig. 1B have been amended so that adhesive tape 2 and its sublayers are the same as in Fig. 1A.

In view of the proposed corrections to Figure 1B, reconsideration and withdrawal of this objection are requested.

Claim 3 stands rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. The Examiner argues that it is unclear whether the claim requires the structure (i.e., leadframe and/or semiconductor chip) defined in the method claim 1 or claim 2. For purposes of

examination, the claim has been assumed to only require that the tape be capable of being used in the method of claims 1 or 2.

In response to this point, Applicants have amended the word “is” to “can be” in claim 3, line 2. Thus, claim 3 is now more clear that the tape only need be capable of use in the method of claims 1 or 2.

Further, the phrase “and the like” has been deleted from claim 3 for clarification. It is submitted that these amendments to claim 3 do not reduce its scope, but aid in clarification. In view of the foregoing, reconsideration and withdrawal of this rejection are requested.

In paragraph 4, claim 3 stands rejected under 35 U.S.C. 102(b), as allegedly being anticipated by Sakumoto et al (U.S. Patent 5,277,972).

The Examiner argues that Sakumoto teaches each limitation of Applicant’s claim 3, for the reasons given.

Sakumoto attaches the tape to a leadframe (col. 1, lines 15-16 et seq.). The Examiner argues that a thermal shrinkage of less than 0.15% is taught by Sakumoto at col. 7, lines 56-59. For purposes of advancing prosecution, claim 3 has been further amended to indicate that the pressure-sensitive adhesive strength is 400 gf/20mm or less at 23° C. Also, new dependent claim 5 describes this feature as well. For support, kindly see page 5, lines 4-14. As Sakumoto does not disclose a tape having this feature, Applicants respectfully request reconsideration and withdrawal of the outstanding anticipation rejection.

In paragraph 6, claims 1 and 3 stands rejected under 35 U.S.C. 103(a), as allegedly being unpatentable over Yuji et al (JP 2-10748A) in view of Sakumoto.

The Examiner argues that Yuji teaches the basic method steps, but does not disclose that the tape has a thermal shrinkage of 3% or less; Sakumoto is therefore cited as teaching this aspect of the claims.

Yuji was cited in the International Search Report. Applicants have provided herewith an English translation of it.

This rejection is respectfully traversed.

The primary objective of the present invention and that of the invention of Yuji seem to be different (for example, Yuji seems not to have an object such as prevention of leaking of a resin from the contact interface). And, Yuji does not seem to disclose or suggest the necessity of low thermal shrinkage as described at line 11 to 22 in page 4 of the present application. Therefore, one of ordinary skill in the art would not have combined the teaching of Sakumoto with Yuji in the manner suggested by the Examiner.

The citations relate to a package mold use where the surface to be adhered to a tape is not required to mount electrically, and more specifically, this package mold use is premised on the use for IC card, etc., where even if a large amount of adhesive residue is generated after the tape is released, it does not directly affect functionally. In general, if something is in contact with the mounting surface, it is likely to adhere foreign matters to the mounting surface. Such is obviously undesirable. In addition, adhering a pressure-sensitive tape, etc. would generate adhesive residue to no small amount. In any event, the citations merely disclose that a tape is adhered to a package surface that has nothing to do with mounting, so as to mold.

On the other hand, the surface to be adhered to a tape in the present invention is a surface

of a lead terminal on which a semiconductor device is finally mounted by soldering.

Accordingly, not only a small amount of adhesive residue after releasing but also any impurity adhesion that rejects a solder at a level of accurate analysis are not allowed. The present invention contravenes the usual thinking in the art and represents a bold idea in which a tape is directly adhered to the mounting surface *per se* so as to mask. The present invention challenging such conventional wisdom cannot be easily expected from the patents disclosing a conventional IC card.

The present invention and the citations are totally different in properties and functions to be required for a tape. With regard to an IC card, releasing a tape is not necessary functionally, and the tape is just required to be released by any means. In contrast, the present invention requires and premises that a tape is released cleanly without leaving any trace. Accordingly, as described in the paragraph beginning from line 4 in page 5 of the present application, the excellent property of the tape of the present invention can be attained in a specific and severe condition in an adhesive force and the like.

The pressure-sensitive adhesive tape of the present invention secures an essential function of being released cleanly so as not to affect the mounting after press-molding. In contrast, an object of a conventional mere “adhesive tape” is just to mold and the “adhesive tape” is to be adhered to the surface having nothing to do with mounting. Thus, the function is apparently different. As can be seen from the above, while the Office Action states that all the features are disclosed in the citations, Applicants respectfully disagree for at least the above reasons.

Also, Comparative Example 2 in the present application demonstrates that poor results

are obtained in the method of the invention, when a tape having a thermal shrinkage above 3% was used. Accordingly, the evidence of record refutes any suggestion that the cited references taught or suggested the method of the present invention.

In view of the foregoing, reconsideration and withdrawal of this rejection are requested.

In paragraph 7, claim 2 stands rejected under 35 U.S.C. 103(a), as allegedly being unpatentable over Yuji and Sakumoto as applied in paragraph 6, and further in view of Hitachi Ltd (JP 11-74412A). The Examiner's stated reasoning appears to be self-explanatory.

At this point, Applicants rely on the patentability of independent claim 1 as a basis of traversal of this rejection. If claim 1 is found allowable, then its dependent claim 2 should be allowed as well.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/719,422

Q62228

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Mark Boland", written over a horizontal line.

Mark Boland
Registration No. 32,197

SUGHRUE MION, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: October 7, 2002

APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 3, the second paragraph has been amended as follows:

Fig. 1A shows a leadframe [A] with an pressure-sensitive adhesive tape adhered thereto, wherein numeral 1 is a leadframe having a group of units each having a large number of stitches 11 arranged around the device hole. Numeral 2 is an pressure-sensitive adhesive tape affixed to the leadframe 1, whose thermal shrinkage on resin encapsulating is controlled to 3% or less, preferably 2% or less, still preferably 1% or less. Numerals 21 and 22 are a pressure-sensitive adhesive layer and a substrate, respectively.

Page 3, the third paragraph has been amended as follows:

In producing resin-encapsulated semiconductor chips according to the present invention, semiconductor chips 3 are placed and fixed in the device holes, one by one, of the leadframe 1 [A] with the pressure-sensitive adhesive tape adhered thereto, and the chip 3 and the stitches 11 of the leadframe 1 are bonded with a bonding wire 31 as shown in Fig. 1B. In Fig. 1B, numeral 2 shows a pressure-sensitive adhesive tape including a pressure-sensitive adhesive layer 21 and a substrate 22, respectively, in the same manner as in Fig. 1A. In the step of resin encapsulating, the semiconductor chip 3 is placed in each cavity 41 of a mold 4 and encapsulated with a resin by transfer molding as shown in Fig. 1C. Then as shown in Fig. 1D, the pressure-sensitive adhesive tape is stripped off the leadframe 1, and the leadframe is cut and trimmed to obtain a resin-encapsulated semiconductor chip shown in Fig. 1E.

IN THE CLAIMS:

The claims are amended as follows:

3. (Amended) A pressure-sensitive adhesive tape to be adhered to a leadframe [and the like], which [is] can be used in the resin encapsulating method for a semiconductor chip according to claim 1 or 2 and has a thermal shrinkage of 3% or less and a pressure-sensitive adhesive strength of 400 gf/20 mm or less at 23°C on resin encapsulating.

New claim 4 and 5 have been added.



RECEIVED

OCT 10 2002

TC 1700

Japanese Patent Laid-Open No. 10748/1990

Title:

METHOD FOR PACKAGING ELECTRONIC PART

Claim:

A method for packaging an electronic part, characterized in that an electronic part to be packaged is temporarily fixed and positioned in a required relative position in a storing hole formed in a packaging board by removable seating means provided to seal the bottom face of the storing hole, connected to be conductive, and sealed to be fixed to the board, and then the seating means is removed.

Detailed Description of the Invention:

[Object of the Invention]

[Industrial Field of Application]

This invention relates to a method for packaging an electronic part suitable for packaging an electronic part in a portable medium such as an IC card.

[Prior Art]

Recently the so-called IC card, for example, has been watched as a portable medium housing an electric part for a CPU, a memory and the like. Although the IC card is substantially equal in shape and size as compared with the current spreading

magnetic card, the IC card is expected to spread instead of the magnetic card in future for the extensive storage amount of information and greater throughput.

In packaging an electronic part to be housed in the IC card, various methods have been adopted to achieve required thinner type packaging. According to one of the packaging methods, as shown in Fig. 3, a storing hole 5 a little larger than the size of an electronic part 1 is formed in a packaging position in a board 3 for packaging the electronic part 1, the electronic part 1 is stored in the storing hole 5, wire bonding is performed, and then an area surrounded by a dam 9 is sealed by a sealant 7. This method can achieve thinner type packaging substantially for the thickness of the board as compared with the case of packaging the electronic part on the board.

[Problems that the Invention is to Solve]

This packaging method, however, has the following points to be improved. That is, in packaging the electronic part 1, a seating board 11 for temporarily fixing the electronic part 1 and the board 3 is needed to accurately position the relative position of the electronic part 1 and the storing hole 5 of the board 3, and keep the same at least in the course of packaging. The seating board 11 is, however, originally necessary only for packaging, and after packaging, it is not necessary. Therefore, the existence of the seating board is an obstacle to further development into a thinner IC card as described above.

The invention has been made in the light of the above circumstances, and it is an object of the invention to provide a method for packaging an electronic part which may contribute to further thinner type packaging of the electronic part.

[Constitution of the Invention]

[Means for Solving the Problems]

In order to achieve the above object, the gist of the invention is such that an electronic part to be packaged is temporarily fixed and positioned in a required relative position in a storing hole formed in a packaging board by removable seating means provided to seal the bottom face of the storing hole, connected to be conductive, and sealed to be fixed to the board, and then the seating means is removed.

[Operation]

In the electronic part packaging method of the invention, the relative positioning for the electronic part to the storing hole of the board is performed by the removable seating means provided to seal the bottom face of the storing hole, the electronic part is connected to be conductive and sealed to be fixed to the board, and then the sealing means is removed.

[Embodiment]

The embodiment of the invention will now be described by the attached drawings.

Figs. 1A to 1C show one embodiment of the invention. The embodiment is characterized in that after a board 3 is bonded

and fixed onto a heat resisting adhesive tape 13 constituting seating means, an electronic part 1 is bonded and fixed on the adhesive tape 13 so that it may be positioned in a designated relative position in a storing hole 5 (See Fig. 1A), and wire bonding by wires 15 and sealing by sealant 7 are performed to fix the electronic part 1 on the board 3 (See Figs. 1A and 1B), and after that, the adhesive tape 13 is separated (See Fig. 1C). The reference numerals designating the same parts are the same as those in Fig. 3, so the detailed description is omitted.

As the adhesive tape 13, selected is one made of material withstanding the melting temperature of the sealant 7 not to cause deformation, breakage and the like.

According to the present embodiment, after the end of packaging, the adhesive tape is thus separated, so that while suitable packaging is secured, there is no obstacle to thinning as compared with the conventional packaging method.

Though the adhesive tape is used as seating means in the present embodiment, it is not restrictive, but the seating means will suffice if it can be easily packaged and removed after the end of packaging.

As the adhesive tape, an insulating one is used, whereby as shown in Fig. 2, after the end of packaging, it is not separated and used intact as an insulating sheet so as to eliminate a working process for separately providing an insulating sheet.

In the embodiment shown in Fig. 2, the height of the sealant 7 is adjusted and the adhesive tape 13 is arranged not only on the base of the board, but on the surface thereof so as to be flush with the board 3. In Fig. 2, the reference numeral 17 is an armor sheet.

[Advantage of the Invention]

According to the invention, as described above, relative positioning of the electronic part to the storing hole of the board is performed by the removable seating means provided to seal the bottom face of the storing hole, the electronic part is connected to be conductive, and sealed to be fixed to the board, and after that, the seating means is removed, so that the invention can contribute to further thinner type packaging of the electronic part.

Brief Description of the Drawings:

Figs. 1A to 1C are diagrams showing one embodiment of the invention;

Fig. 2 is a diagram showing a modified form of the invention; and

Fig. 3 is a diagram showing the prior art.

1: electronic part 3: board 5: storing hole 7: sealant
9: dam 11: seating board 13: adhesive tape 15: wire 17:
armor sheet